GENERAL DESCRIPTION OF FAMILY FARE IN BANG CHAN

As we turn to a detailed description of the family fare, we should like to point out that starvation was unknown in Bang Chan. Although much room remains for improvement in diet, "hollow hunger" was uncommon. In the few times when disastrous flood destroyed the year's crop, the government was able to provide enough rice so that it need not be rationed. People still ate their fill. Even floods had their advantage: one could fish out the window. That gross caloric undernutrition was rare was borne out by examination of the school children (Hauck, 1956). "On the average . . . Bang Chan children could not be considered as markedly underweight. Few were so thin that one could 'count their ribs' and still fewer would be considered plump by American standards." In a random sample of village households that included about 10% of the population, the heaviest man weighed 65 kg. (151.8 pounds) and the heaviest woman 70 kg. (154 pounds). We noted no more than half a dozen adults who appeared to be "overweight." Most were middle aged or older, and none of them did strenuous field work.

Sources of Food

Home Production, Storage and Preservation

Rice. - Rice is an essential part of any Thai meal. The majority of the rice farmers in Bang Chan had rice for home consumption milled for them at Minburi. In general, they took their own paddy to the mill, and brought the resulting milled rice home, where it was stored in a box or mat-bin. Although, according to a recent survey (Goldsen and Ralis, 1957) nearly a third of the households owned a home rice mill, undermilled or home-pounded rice was not widely used in Bang Chan. Information on this point was obtained for 333 of 336 "kitchen-unit"[1] households in the village. Of these 5 consumed home-milled rice only, 51 used home-milled rice in major part, 78 in minor part, and 199 not at all.

In households where home-milled rice was used, during June enough would be pounded to last until harvest, at which time hands were sore and bleeding from the field work and home pounding was impossible. At the time when data for the present report were being gathered, most families took paddy to the mill when water in the canal was high enough so that it could be transported by boat. If a farmer on a subsidiary

1. In some large houses, two related family groups lived together but maintained separate kitchens.

196 Average intakes of riboflavin were estimated to be about a third, or less, of the allowances. Estimates of calcium intake were, on the average, only 20% of the allowance for Group A, and 30% of that for Group B. Although the calcium allowances were thought to be conservative, estimated requirements based on calcium balance experiments are believed by some investigators to reflect usual intake rather than need, and the extent to which man may adapt to a low calcium diet is still undetermined. Among residents of Bang Chan, no evidence was noted other than short stature and small bones, which might suggest a calcium deficiency.

The vitamin A value of diets of both Groups A and B appeared to be low. Clinical signs possibly associated with vitamin A deficiency, i.e. xerosis and phrynoderma, occurred among residents of Bang Chan (Hauck, 1956), and as would be expected from the method of selection of the two groups, such skin signs were more prominent among members of Group A than Group B. On this basis one would expect the vitamin A intake of Group A to be less than that of Group B, whereas the reverse appeared to be the case on the survey days; but the higher estimated vitamin A value for the diets of Group A than Group B may not represent a real and consistent difference. The yellow (2)sa-(5)noo flowers, for which no nutrient values were found, were used rather liberally by some families in Group B at one season and may have contributed vitamin A value. Moreover, owing to unavoidable changes in the plan for alternating visits to the two groups of families, those in Group B were visited more often when the level of water in the canals was low and the leafy water plants were not available. The unusual intake of a large amount of yellow sweet potato by one family in Group A on one survey day may also have tended to distort the picture. Families in Group A, however, used substantial amounts of sweet basil leaves, whereas in Group B, this herb was used for seasoning only.

The estimated amount of thiamine available per capita, before cooking, was 73% of the estimated allowance for Group A and 79% for Group B. Since over four-fifths of the thiamine content of the foods used by each group came from rice, and the thiamine loss when rice is cooked as it was in Bang Chan has been estimated as 75% or more (Tmangraksatve and Srisukh, 1955) the actual per capita intake of thiamine must have been below the value of 0.23 mg. per 1000 calories which the Food and Nutrition Board, National Research Council (1953) considered to be the minimal requirement for adults. According to Nicholls (1951, p. [illegible]) a ratio of Thiamine: Non-fat Calories of 0.3 - 0.35 is borderline and too low, and ratios below 0.3 are associated with beriberi-producing diets. That the diets of some of these people, as eaten, were in fact dangerously low in thiamine, is attested by the occurrence of beriberi and history of beriberi among them. Of the 15 persons, 20 years of age or older in Group A, 7 had knee jerk

125 asleep, and the mother was reluctant to wake him. Thus, for some children only three or four measurements were obtained.

The measurements of height and weight of each child were tabulated by age in months at observation.[1] A child was considered to be the age at his last month's birthday unless he was within 7 days of the next month's birthday. For example, a child who was measured at 2 months 25 days was considered to be 3 months of age, whereas a child who was measured at 2 months 20 days was considered to be 2 months old at the time of measuring.

Results.

145 Growth in Height and Weight Compared to Children Attending
145 Well Baby Clinics. - The mean, median, and range of height and
125 weight of children measured at 1 month, 3 months, 6 months, 9
141 months of age, and so on, were determined (Tables 16 and 17). These figures include data obtained for all children who were measured at any of the selected ages but not weights and measures made at intervening ages. No marked difference was noted between mean and median values for height and weight. At almost all ages the mean and median values for height and weight of boys were greater than those for girls.

For comparison with these observations, only two reports on height and weight of Thai infants have come to our notice. Both of these dealt with infants and young children attending well baby clinics in Bangkok.

145 Over a period of 5 years, Dr. Montri Mongcolsamai (1939)
141 collected data on height and weight of infants and children who came to the Well Baby Clinic at the Siriraj Hospital. These were described as normal children free from disease and ranging in age from 1 day to 6 years. Most of the children were Thai, most were from Bangkok, and most had been born in the Siriraj Hospital. In all, 2664 children were observed; 3006 measurements of height and 3570 measurements of weight were obtained.

Dr. Montri (1939) grouped the data according to age and sex, reporting mean values for height and weight of children under 1 year of age at monthly intervals and of children over 1 year of age at intervals of 6 months. For example, weights of all male infants who were 1 month old but younger than 2 months were averaged, also, weights of all male children who were 1 year old but younger than 1 1/2 years were averaged. Average weights and lengths of newborn infants and of infants under 1 month of age were included.

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1. The height and weight of each child at each observation were reported by Smith (1958).

[see p. 36-37 - Analysis]

Table 16. Mean, Median, and Range of Heights and Weights of Male Infants and Young Children Who Were Measured at Selected Ages, Bang Chan, Thailand, 1952-54.

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Age	No.	Height			Weight		
		Mean	Med.	Range	Mean	Med.	Range
		cm.	cm.	cm.	kg.	kg.	kg.
1 mo.	5	54.9	54.5	54.0-57.5	3.3	4.5	3.8- 5.25
3 mo.	9	59.4	59.5	49.5-64.5	6.1	5.5	5.0- 8.35
6 mo.	10[1]	64.8	65.8	60.0-69.0	7.2	7.0	6.0- 8.5
9 mo.	10	68.2	68.3	65.0-73.0	7.6	7.5	6.9- 8.5
1 yr.	11	70.9	70.5	65.0-77.0	8.2	8.0	7.0-11.0
1 yr. 3 mo.	12	73.3	74.0	70.0-76.0	8.6	8.5	8.0- 9.75
1 yr. 6 mo.	9	76.7	76.5	74.0-80.0	9.3	9.0	8.0-10.5
1 yr. 9 mo.	6	79.0	80.3	73.5-81.0	9.7	9.8	7.5-11.0
2 yr.	6	79.1	80.3	74.5-82.5	10.1	10.5	8.0-11.5
2 yr. 3 mo.	5	81.3	82.0	76.0-85.0	11.2	12.0	8.5-13.5
2 yr. 6 mo.	3	84.0	83.5	80.5-88.0	10.7	11.0	10.0-11.0
2 yr. 9 mo.	3	86.2	85.5	84.0-89.0	11.2	11.5	10.0-12.0
3 yr.	7	87.9	87.5	85.0-92.0	12.0	12.0	10.5-13.5
3 yr. 3 mo.	6	88.0	87.8	85.0-92.5	12.0	11.8	11.0-13.75
3 yr. 6 mo.	7	89.8	89.5	87.0-95.0	12.5	12.5	11.0-14.5
3 yr. 9 mo.	4	92.3	92.5	90.0-94.0	12.9	13.0	12.0-13.5
4 yr.	3	94.0	94.5	91.5-96.0	14.2	14.5	13.0-15.0
4 yr. 3 mo.	4	95.9	95.5	93.5-99.0	14.8	15.0	13.0-16.0

1. An additional child was weighed but height was not measured.

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Table 17. Mean, Median, and Range of Heights and Weights of Female Infants and Young Children Who Were Measured at Selected Ages, Bang Chan, Thailand, 1952-54.

Age	No.	Height			Weight		
		Mean	Med.	Range	Mean	Med.	Range
		cm.	cm.	cm.	kg.	kg.	kg.
1 mo.	9	53.1	52.0	49.0-59.0	3.9	3.75	3.35- 4.45
3 mo.	10	59.1	59.3	54.0-64.5	5.7	5.4	4.45- 7.0
6 mo.	9	62.8	62.5	57.5-69.0	6.6	6.5	4.8 - 8.0
9 mo.	11	65.3	64.5	58.0-73.0	7.0	7.0	5.35- 8.5
1 yr.	12	69.5	68.7	63.0-76.0	8.0	7.8	6.0 -11.0
1 yr. 3 mo.	11	72.1	71.0	68.0-80.5	8.2	7.5	7.0 -10.5
1 yr. 6 mo.	11	72.6	72.5	67.5-83.0	8.2	8.5	4.5 -11.0
1 yr. 9 mo.	7	77.6	75.0	74.0-86.5	9.7	9.0	8.0 -12.0
2 yr.	9	79.2	79.5	73.0-85.0	9.9	9.5	7.5 -13.0
2 yr. 3 mo.	8	78.4	78.3	74.0-82.5	9.3	9.5	7.5 -10.5
2 yr. 6 mo.	6	80.7	81.3	76.0-84.0	10.0	10.0	9.0 -11.0
2 yr. 9 mo.	6	83.4	83.0	78.5-88.0	11.3	11.8	9.7 -12.0
3 yr.	6	88.1	88.0	84.5-92.0	11.8	11.8	10.0 -14.0
3 yr. 3 mo.	3	87.3	86.5	85.0-90.5	11.5	11.5	11.0 -12.0
3 yr. 6 mo.	2	87.5	87.5	86.5-88.5	12.0	12.0	11.0 -13.0
3 yr. 9 mo.	1	87.5			14.0		

In some age groups fairly large numbers of children were observed and in other groups relatively few. None of the groups up to 4 1/2 years of age with whom the children in this series could be compared included fewer than 30 individuals. The numbers of boys and girls measured at each age were about the same. 145 125 141

Dr. Amara Chandrapanond (1957) reported the mean heights and weights of 20 babies who were weighed and measured at monthly intervals over a period of a year. She did not report values for boys and girls separately, but, in general, at each age these fell between those for males and females as reported by Dr. Mostri (1939). 145 141

In figure 1[1] the median heights of boys and girls in Bang Chan together with the number of individuals who were measured at 3, 6, 9, 12, 15, 18, or 21 months are shown in comparison to the height curves constructed from values reported by Dr. Mostri (1939). Corresponding median weights are shown in figure 2.[1] Although the groups are small, the tendency for both height and weight of young children in Bang Chan to be below that of children attending a well baby clinic in Bangkok is clear.

One should note, however, that Dr. Mostri characterized the children he observed as "free from disease", whereas some of the children of Bang Chan had colds, skin infections, or other minor disorders which might have affected their weights. Such disorders are very common, and we do not know whether or not they disqualified children attending the Well Baby Clinic from inclusion in the series for which heights and weights were reported. [164]

Graphs of height-age and weight-age were plotted for each child in this study and for small groups of children who were observed regularly over a year or so at the same ages. [228]

Most of the children increased in height in a fairly regular fashion, the slopes of their height curves being about the same as the curve drawn from Dr. Mostri's values, although there were individual variations in this. The height curves of many more children of Bang Chan were below than were above the curve drawn to Dr. Mostri's values. Of the 35 girls measured, the height curves of 6 were above, 6 were about the same as, and 23 were below the curve drawn to Dr. Mostri's values for girls. Of the 36 boys measured, the height curves of 9 were

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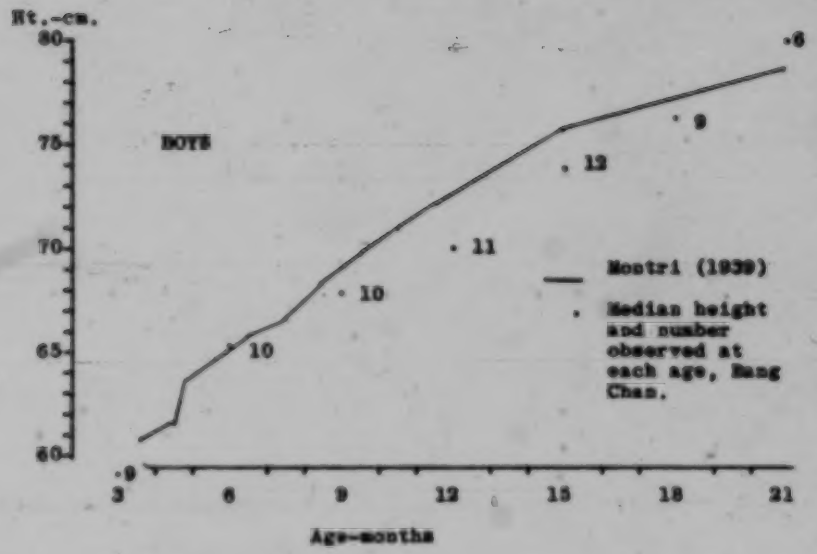
1. Mean values reported by Dr. Mostri were plotted at 1-month intervals for the first 11 months, then at the midpoint of the intervals he reported. For example, measurements reported for children 1 to 1 1/2 years of age were plotted at 1 year 3 months.

[TEXT CONTINUED ON PAGE 41].

1 [see p. 34 - Analyst; 2 [see p. 40 - Analyst]



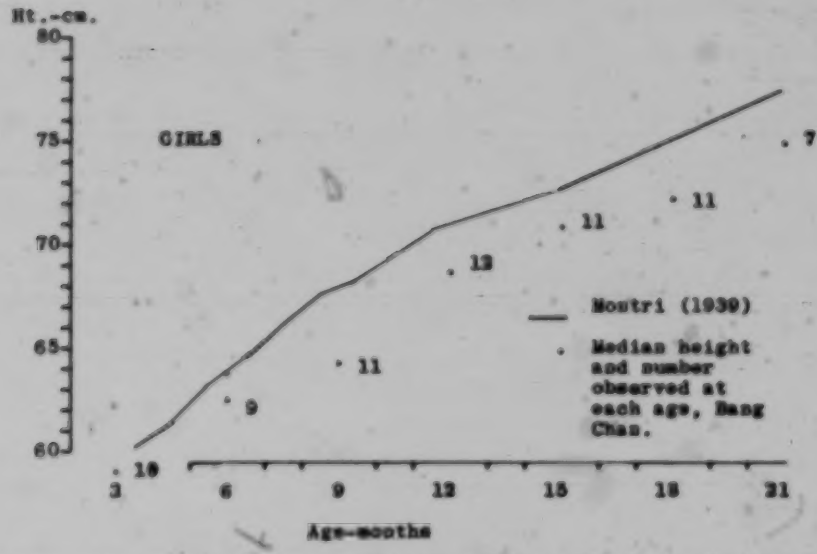


Figure 1. Median Heights of Children Under 2 Years of Age, Bang Chan, Compared to Mean for Children Attending Well Baby Clinic, Bangkok.

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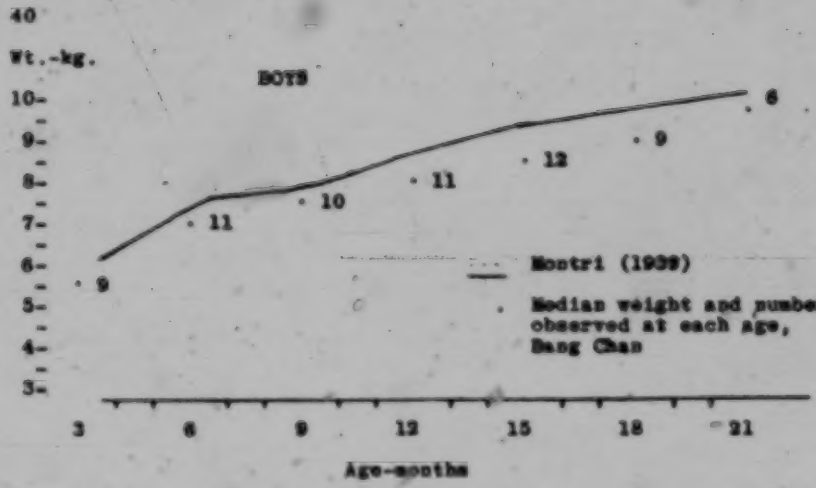

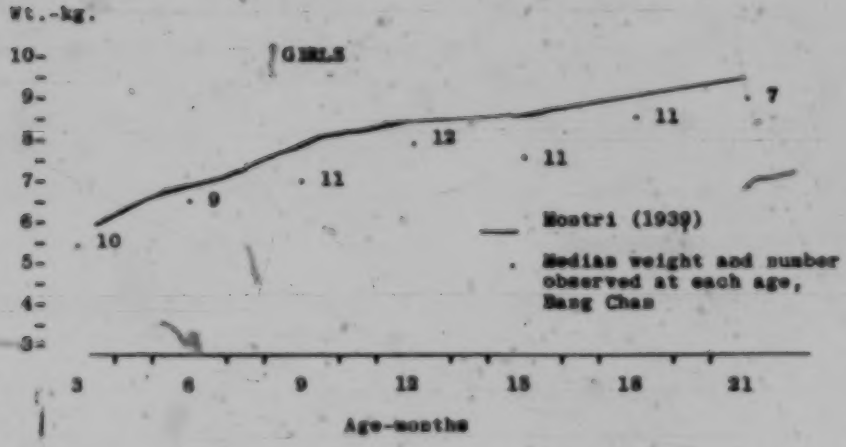

Figure 2. Median Weights of Children Under 2 Years of Age, Bang Chan, Compared With Mean for Children Attending Well Baby Clinic, Bangkok.

145 above, 12 were about the same as, and 13 were below the curve
141 drawn to Dr. Montri's values for boys.

[125] Mean heights and weights of groups of children who were observed regularly at 3-month intervals, at the same ages, were determined. The numbers in these groups were small because of difficulties encountered in collecting data precisely according to plan, but curves could be constructed for some such groups covering periods up to 12 months. These were compared to those based on Dr. Montri's values. The curves of mean height for such small groups were fairly smooth with slopes similar to but below the curve drawn to Dr. Montri's data.

For the younger groups of children in Bang Chan, curves for mean weights were generally below those drawn to Dr. Montri's values. Although the groups under 1 year of age were, on the average, about 1 week younger than the children observed by Dr. Montri, adjustment[1] did not eradicate the difference. Differences between mean weights for groups of children 18 months of age and older, in this series and in Dr. Montri's, were less consistent than for the younger children.

145 Many studies on weight of infants in the tropics indicate that weight gain during the first 6 months or so of life is comparable to that of infants in Europe and America. After 6 months of age, however, the weight curves become flattened (Jelliffe, 1955; Falkner et al., 1958). Both Dr. Montri (1939) and Dr. Amara (1957) noted this tendency in the weights of the Thai infants they studied. Dr. Montri (1939) compared the weights of the Thai children he observed with values reported for Japanese children. He found that up to 6 months of age Thai children weighed as much as Japanese children but that after this age they weighed less. Dr. Amara (1957) compared the weights of the infants she observed with those of American babies and found that after 4 months of age the Thai infants gained weight more slowly. Both of these observers expressed the opinion that Thai babies gained weight more slowly as they grew older because their diets were inadequate.

145 In general, Thai children are short and light as compared
141 to children in the U.S.A. In the Bang Chan group, for example, at 3 and 6 months the median weights for male infants approximated the 25th percentile of male infants as reported by Stuart and Stevenson (1950). At 9 months, however, the median weight was

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1. Dr. Montri calculated that boys 3 to 6 months old gained, on the average, 23 grams per day and that girls gained 22 grams per day; from 6 to 9 months the figures are 7.3 and 7.8; and from 9 to 12 months they are 7.4 and 7.6 grams, for boys and girls respectively. These values were calculated for a week and added to the mean weights of the children of Bang Chan to find out if the difference could be accounted for in this way.

about the same as the 3rd percentile of male infants in the U.S.A., and from one year on the values fell below the 3rd percentile. Norms for American children are inappropriate for use with Thai, but an increasing lag in growth such as we observed may be a matter for concern.

Weight Loss and Failure to Gain. - Many of the children in Bang Chan failed to gain or actually lost weight over periods of time. This occurred frequently between two weighings which were 1 to 4 months apart and occasionally when a child was reweighed after an interval of 6 months. In some children loss of weight or failure to gain extended over two weighing intervals. Such loss or failure to gain may be an important sign of malnutrition (Jelliffe, 1955).

Relation to age. - The ages at which the children experienced weight loss or failure to gain were determined by inspection of the weight-age graphs. As shown in Table 17, a period of loss of weight or stationary weight was noted for only one child below the age of 6 months. Between the ages of 6 and 12 months, a time when healthy infants usually continue to grow rapidly, such periods of weight loss or failure to gain for intervals of 1 to 5 months between weighings were observed in almost 40 per cent of the infants. Dr. Mostri (1939) and Dr. Amara (1957) did not discuss the growth of individual infants, hence we do not know to what extent failure of some infants to gain weight may account for the depressed growth, on the average, which both of these observers reported for infants of this age.

During the second year of life children may be expected to gain weight less steadily, but more than 40 per cent of the children of this age in Bang Chan lost weight or failed to gain over intervals of 1 to 7 months.

After 2 years of age approximately one-half to two-thirds of the children weighed in a given 6-month period lost or failed to gain weight. Of 68 children who were weighed and measured over a period of a year or more, only 16 did not experience such loss or failure to gain between any two weighings. Most of these were in the youngest age group, only 3 were over 2 years old at the end of the study.

Possible reasons for failure to gain. - From the information available specific reasons cannot be given for the loss or failure to gain weight of so many of the young children of Bang Chan. Infection may have played a role, although we saw little evidence of severe infection and it was seldom mentioned. Increased activity as children grow older might affect rate of gain at the toddler age. For safety very young children in Bang Chan were closely tended which meant that their activities were rather restricted. As they became older and learned to

[See p. 37 - Analyst]

BANG CHAN

Summary

12 The general condition of health and sanitation in the village of Bang Chan, Thailand, and the nutritional status of 166 persons in a random sample including 31 village households and of 233 primary school children are described.

• 141 The mean height for adult men in the random sample was 158.6 cm. (62.4 inches) and for women, was 151.3 cm. (59.6 inches).

Mean weights for adult men and women were 53 kg. (116.6 lb.) and 45.3 kg. (99.7 lb.) respectively. Mean and median weights for various age groups did not differ markedly nor consistently.

145 In general, the Thai children were shorter and weighed less than western children of the same ages. Mean heights and median weights fell below the 10th percentile of Iowa school children whose measurements have been reported by Stuart and Meredith (1946).

The reported age at menarche, for 94 females in Bang Chan, ranged from 13 to 19 years, with a median age of 15.

As judged by the median ages of eruption of specific permanent teeth and the number of permanent teeth per child at each age level, dental maturity of children in Bang Chan was approximately the same as that of children in other regions, both western and eastern, for which data are available. Although the average number of teeth at some ages was lower for children in Bang Chan than for American or English children, the differences were neither marked nor consistent.

164 Children in the Bang Chan primary school were found to be relatively free from caries. Of 226 school children 7 to 14 years of age, whose teeth were examined by a dentist, 42% were completely free of caries of both deciduous and permanent teeth. Of the total group of children, 68% (76% of 116 boys and 60% of 110 girls) were free of caries of permanent teeth. The average number of carious permanent teeth per child was 0.5 for boys and 0.9 for girls. For children with caries experience, the figures were 1.9 and 2.3 for boys and girls respectively. None of the children examined had any filled teeth.

The reason for the relatively low incidence of caries

5: Mauck et al. D-5 (1952-1954) 1956 AO7 Central Thai AO7

BANG CHAN

12 total of 336 households in Bang Chan (Ralis, 1955).[1] Appropriate portions of schedules used are included in Appendix A.

Women in the random sample of village households, and women whose young children were included in the child feeding study, were asked about survival of all children born to them (See Appendix A, schedule 3, item 36). With the exception of a few old women, those who reported that one or more children had died, were asked to describe the child's symptoms and the circumstances surrounding the death. When the description was clear enough to permit diagnosis, the physician recorded cause of death, as well as the informant's description.

Sanitation

Information concerning toilet practices was obtained from adult members in 30 of the 31 families included in the random sample of households. Additional information on toilet care of infants and toilet behavior of preschool children was recorded in field notes.

In connection with a weighed dietary survey, the observers noted practices relating to care of food, disposal of garbage, and source and treatment of drinking water, in 11 households on 4 days each throughout a year.

Schedules or portions of schedules used in recording the information on sanitation are included in Appendix A.

Results

Physical Measurements

141 145 Heights and Weights. - Mean values and ranges for heights, cristal heights and bicristal diameters, and both mean and median values and ranges for weights of boys and girls in the Bang Chan primary school are classified by age,

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[592] 1. In Ralis' survey, each "kitchen-unit" was considered as a household. As generally used in this data paper, "household" includes all persons living under one roof. A number of such households in Bang Chan include more than one kitchen-unit.

[see pp. 51-52--Analyst]

BANG CHAN 4

8

in Tables 1 and 2.[1]

Heights of children in the Bang Chan elementary school were, on the average, less than mean heights for Thai children given by Yong Chutima (Chutima, 1939). They are much below the mean heights at various ages, from charts (Class II) in use at the Dept. of School Hygiene, Bangkok.[2] Curves for mean weights of children in Bang Chan cross Dr. Yong's average curves, but are well below the average curves for girls and boys in Class II, School Hygiene charts (Figures 1 and 2). When compared with mean weights for children of the same height and age, from tables in use at the Dept. of School Hygiene, however, the two curves are seen to be similar (Figure 3). Mean heights and weights for rural children as reported by Zimmerman (1931) are not very different from those in Bang Chan.

In general, Thai children are shorter and weigh less than western children of the same age. For example, at all ages, mean heights and median weights for both boys and girls in Bang Chan fell below the 10th percentile of the Iowa school children whose measurements are reported by Stuart and Meredith (1946) (Table 3).[3] Weight of clothing was probably about the same for the two groups. In general, the median weight for a given age, in Bang Chan, corresponds to the weight of the 50th percentile for Iowa children 2½ to 4 years younger. Thus the median weights for 8 year old boys and girls in Bang Chan, were similar to the weights of the 50th percentile of Iowa boys and girls 5 to 5½ years old, and the median weights of 13 year old boys and girls in Bang Chan were similar to weights of the 50th percentile of Iowa boys and girls at 10 and [illegible] years of age, respectively. The tallest and heaviest boys and girls of these ages in Bang Chan were shorter and lighter than the corresponding median values for Iowa school children. On the average, however,

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1. Median weights are generally considered to be more representative of a group, but mean values are included as well, for comparison with results of certain other studies.

2. Unpublished data, based on measurements of over 15,000 children, both urban and rural, made over a period of years, and compiled by Dr. Laong. Furnished through the courtesy of Dr. Ladda of the Dept. of School Hygiene, Bangkok. Subjects were grouped as Classes I and II, of which roughly 1/3 were considered Class I.

3. Most of these observations were made in November or early December, 1952. On the basis of subsequent observations, many children were found to weigh less in May than during the previous February, but weight gains were again observed the following August and November.

TEXT CONTINUED ON PAGE 15

[see pp.9-13-An] [see p. 14-An.]

Table 1

Heights, Weights, Cristal Heights and Bicristal Diameters
of 116 Male Children in Bang Chan Primary School, 1952-53, Classified by Age.

Age[1], Years	No. of Persons	Height		Weight[2]			Cristal Height		Bicristal Diameter	
		Mean	Range	Mean	Median	Range	Mean	Range	Mean	Range
		cm.	cm.	kg.	kg.	kg.	cm.	cm.	cm.	cm.
7	5	111.5	106.5-114.0	18.1	18.75	15.5-19.25	64.0	60.5-67.5	19.3	18-20.5
8	19	113.6	106.0-123.5	19.5	19.75	16.0-23.0	64.4	59.5-70.0	19.5	18-20.5
9	9	115.8	109.0-124.5	20.0	19.50	16.5-25.25	66.3	61.5-73.5	19.4	18-22.0
10	22	121.9	113.5-130.75	22.7	22.25	18.0-29.0	70.1	62.0-76.5	20.2	19-22.0
11	24	125.0	116.0-132.5	23.8	23.75	19.0-30.0	72.9	63.5-80.0	20.7	18-23.0
12	18	125.2	119.5-141.0	26.2	25.25	22.0-34.0	76.3	68.5-87.0	21.2	18-24.0
13	18	138.9	126.5-151.5	31.8	32.75	23.0-41.75	82.3	74.5-94.0	23.2	21-25.5
14	1	131.5		29.0	29.00		76.0		22.0	

1. Age to nearest birthday. For 3 boys in the school, age was uncertain, therefore their measurements were excluded from these averages.

2. For children weighing 22.75 kg. or more, weight of clothing was about ¼ kg.; clothing of smaller children weighed less than this.

• IHI IHS

S: Hauck et al. D-5 (1952-1954) 1956 AO7 Central Thai AO7

Table 2

Heights, Weights, Cristal Heights and Bicristal Diameters of 109 Female Children in Bang Chan Primary School, 1952-53, Classified by Age.

Age[1], Years	No. of Persons	Height		Weight[2]			Cristal Height		Bicristal Diameter	
		Mean	Range	Mean	Median	Range	Mean	Range	Mean	Range
		cm.	cm.	kg.	kg.	kg.	cm.	cm.	cm.	cm.
7	8	109.0	106.5-114.0	16.9	17.4	15.0 -18.75	61.0	58.0-65.0	18.8	18.0-20.0
8	15	113.5	103.0-125.0	19.2	19.8	14.5 -24.25	64.7	56.0-74.5	19.5	18.0-21.0
9	9	118.3	114.5-125.0	22.1	22.0	20.25-26.50	67.8	66.0-70.0	20.1	18.0-22.0
10	12	121.6	113.5-134.5	22.5	22.0	19.0 -29.75	71.0	67.0-82.0	20.3	19.0-22.0
11	24	126.9	117.5-141.0	24.7	24.4	18.5 -30.5	74.5	62.5-85.0	21.3	19.0-23.0
12	21	133.3	124.5-150.5	28.2	28.0	22.0 -38.0	79.1	72.5-87.5	22.4	20.0-25.0
13	18	137.1	126.5-146.0	30.8	30.4	21.0 -37.25	81.6	70.0-90.0	22.8	19.5-26.0
14	2	137.7	133.0-142.5	32.9	32.6	31.75-33.75	80.5	76.5-84.5	21.5	19.5-23.5

1. Age to nearest birthday. For 5 girls in the school age was uncertain, therefore their measurements were excluded from these averages.

2. For children weighing 22.75 kg. or more, weight of clothing was about ¼ kg.; clothing of smaller children weighed less than this.

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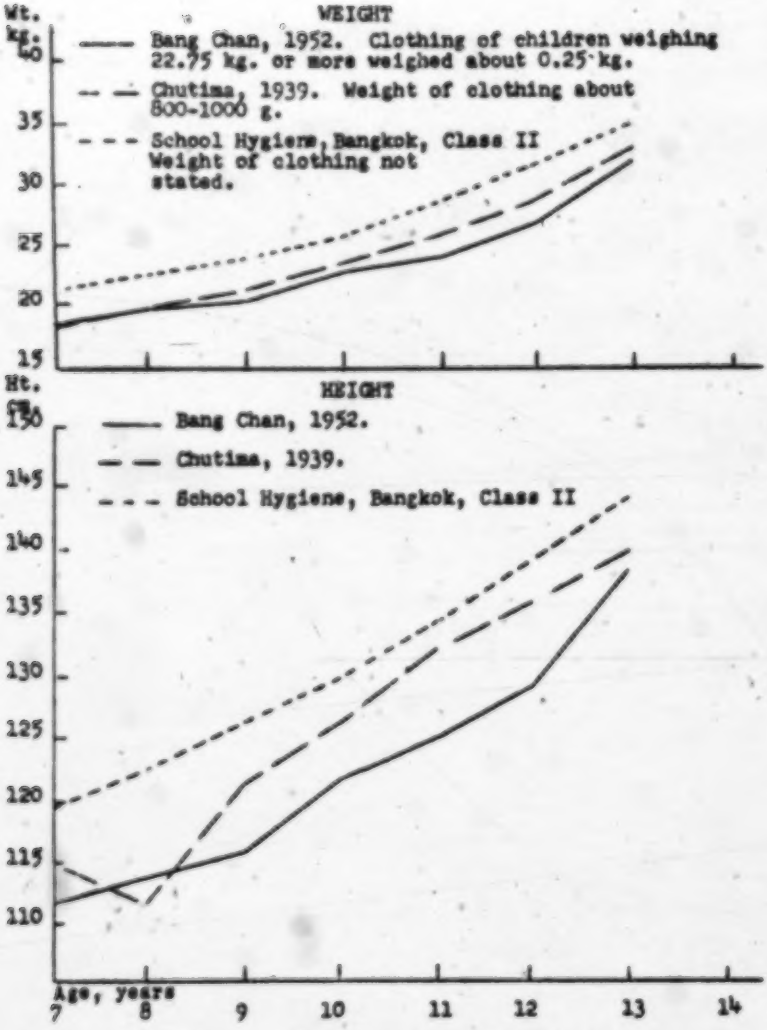

Figure 1. Mean heights and weights of boys in Bang Chan elementary school, compared with mean heights and weights of Thai children as reported by others.

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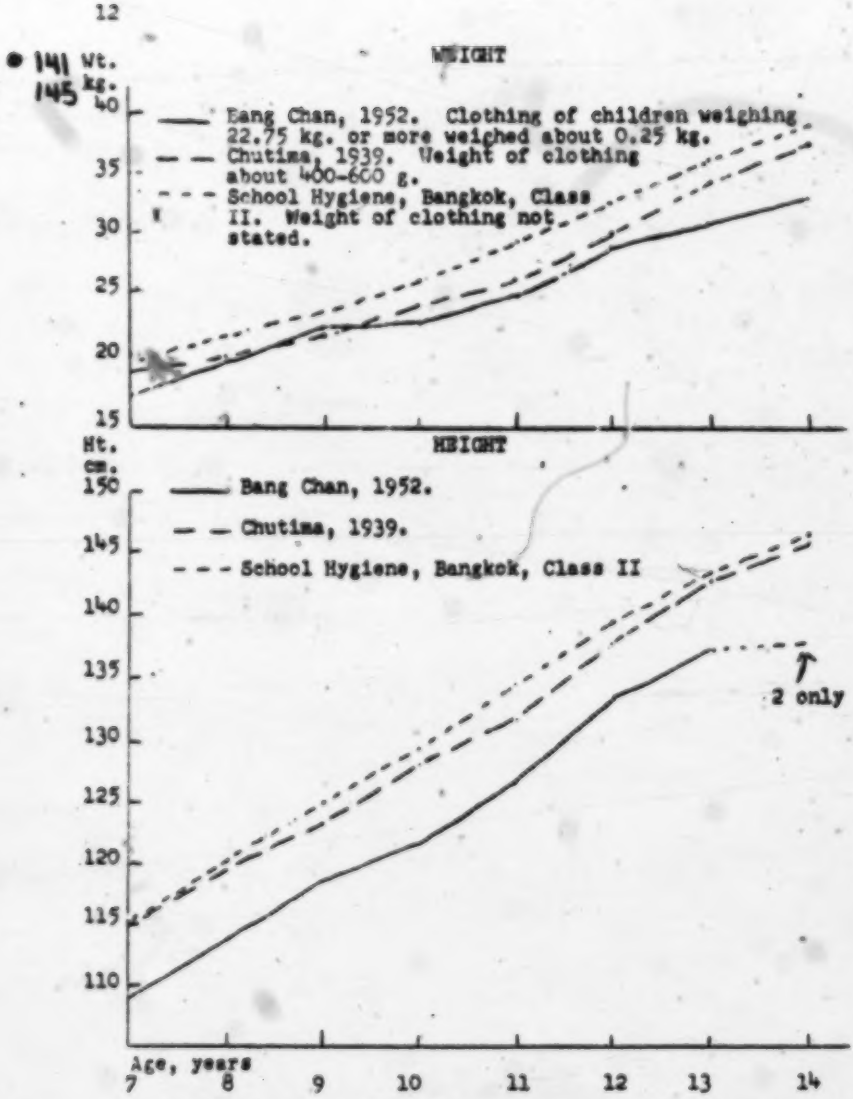

Figure 2. Mean heights and weights of girls in Bang Chan elementary school, compared with mean heights and weights of Thai children as reported by others.

BANG CHAN

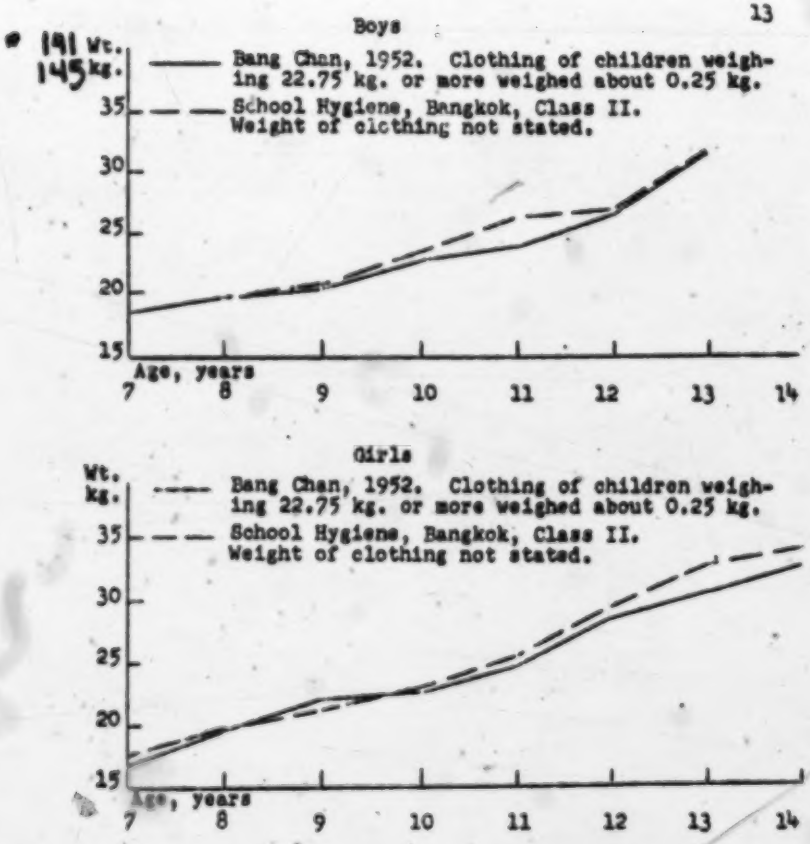

Figure 3. Mean weights of boys and girls in Bang Chan elementary school compared with mean weights (Class II) for children of the same height and age, in table used at Department of School Hygiene, Bangkok.

5: Hauck et al. D-5 (1952-1954) 1956 AO7 Central Thai AO7
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Table 3

Heights, Weights and Bicristal Diameters of Children in Bang Chan Elementary School, Compared to Measurements of American School Children (Stuart and Meredith).

		Bang Chan				Stuart and Meredith[1]		
		Height		Wt.[2]	Bicr. diam.	Percentile 10		
	Age[3]	Mean	Range	Med.	Mean	Ht.	Wt.[4]	Hip Width
		cm.	cm.	kg.	cm.	cm.	kg.	cm.
Boys	8	113.6	106.0-123.5	19.75	19.5	123.1	23.2	19.2
	11	125.0	116.0-132.5	23.75	20.7	137.3	30.1	21.1
	12	129.2	119.5-141.0	25.25	21.2	142.4	32.7	21.9
	13	138.9	126.5-151.5	32.75	23.2	146.6	34.9	22.7
Girls	8	113.5	103.0-125.0	19.75	19.5	122.1	22.0	19.1
	11	126.9	117.5-141.0	24.4	21.3	137.0	28.4	21.4
	12	133.3	124.5-150.5	28.0	22.4	142.6	31.5	22.4
	13	137.1	126.5-146.0	30.4	22.8	149.1	36.2	23.6

1. H. C. Stuart and H. V. Meredith (1946).
2. Includes small amount of clothing, weighing on the average about ½ kg. for the 11-13 year old children.
3. Ages 8, 11-13 chosen for comparison because for each age from 15-24 children of each sex had been measured.
4. Weight in pounds changed to kg. Children were weighed in light socks, shorts, and for older girls, brassieres.

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141 145 Bang Chan children could not be considered as markedly underweight. Few were so thin that one could "count their ribs" and still fewer would be considered plump by American standards.

141 age[1] Heights and weights of males and females over 7 years of in the family survey are summarized in Tables 4 and 5. The height of the tallest man in the random sample was 172.5 cm. (67.9 inches) and that of the shortest, 150.5 cm. (59.3 inches). The height of the tallest woman measured was 159 cm. (62.6 inches), but one 16-year old girl, the daughter of the tallest man in the random sample, was taller, 161 cm. (63.4 inches). The height of the shortest adult woman measured was 142.5 cm. (56.1 inches). Mean heights for men and women 20 years of age or older, in the random sample were 158.6 cm. (62.4 inches) and 151. cm. (59.6 inches) respectively.

The weight of the heaviest man in the random sample was 69 kg. (151.8 pounds) and that of the heaviest woman was 70 kg. (154 pounds).

Mean weights for men and women in the random sample were 53 kg. (116.6 pounds) and 45.3 kg. (99.7 pounds) respectively. Note that, in general, differences are slight between mean and median weights for age and sex groups including a number of individuals. The group of 6 men over 60 years of age is an exception, as values for two individuals weighing 66 and 69 kg. respectivoly raise the mean markedly. An even wider range of weights occurred in the group of women 60-81 years of age, but the influence of one high weight (70 kg.) was offset by a correspondingly low weight (27 kg.). Thus the tendency noted among western populations, for mean weight to exceed the median weight for a given age and sex group, was not apparent in the population of Bang Chan.

141 145 Girls in Bang Chan may have reached adult height and weight by age 20, since the small differences in the averages for ages 15-19 (mean age 17 years) and the successively older age groups are probably associated with individual variation and the small numbers in each group (Table 5).[A] Note that, in general, Bang Chan women did not appear to increase in weight with age, after adult stature is reached. Zimmerman (1937) states that Thai females reach maturity of height at age 17. Mean values from School Hygiene tables are similar, for heights of school girls 17 or 18 years of age and older, and mean weight increases from 17 years on are in the neighborhood of 1 or 2 kg. Mean heights for adult women in the random sample of households in Bang Chan are slightly below those recorded by other observers (Table 6).[B]

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1. Measurements of preschool children are included in Appendix B, Table 19.[C]

[A] [see p.17-An.] [B] [see p. 18-An.] [C] [see p. 67-an.]

Table 5

Summary of Heights, Weights[1], Cristal Heights and Bicristal Diameters of 70 Females Over 7 Years Old, in the Random Sample of Village Households, Bang Chan, 1952-53

Age in Years	No. of Persons	Height		Weight[1]			Cristal Height		Bicristal Diameter	
		Mean	Range	Mean	Median	Range	Mean	Range	Mean	Range
		cm.	cm.	kg.	kg.	kg.	cm.	cm.	cm.	cm.
8	4	112.4	100.0-117.0	18.2	19.6	13.0 -20.5	63.1	56.0-66.0	19.4	18.0-20.5
10	4	124.0	120.0-126.5	24.1	23.6	19.75-29.5	71.9	67.5-75.0	19.8	18.0-21.0
11	2	122.3	120.0-124.5	23.1	23.1	22.0 -24.25	71.5	69.0-74.0	21.0	20.5-21.5
12	3	135.3	127.0-140.5	29.7	30.5	27.75-30.75	79.0	75.5-81.0	22.0	21.0-23.0
13	3	142.0	138.5-145.5	34.9	36.0	32.25-36.5	85.8	84.5-87.5	21.7	21.0-23.0
14	1	142.5		33.8	33.8		84.5		19.5	
15-19	8	151.3	143.5-161.0	45.4	45.5	40.0 -50.5	90.0	85.0-96.0	25.8	23.0-27.0
20-39	21	150.1	142.5-158.0	45.9	47.0	32.5 -58.0	87.2	81.5-96.5	26.3[2]	22.0-31.0
40-59	16	150.3[2]	143.5-157.0	44.0	43.0	37.0 -55.5	87.8	78.0-93.5	26.9	23.0-29.5
60-81	8	151.4	146.0-159.0	46.0[2]	46.3	27.0 -70.0	88.1[2]	84.0-93.0	28.0[2]	24.0-30.0
Partial Total 20-81	45	151.3	142.5-159.0	45.3	45.7	27.0 -70.0	87.6	78.0-96.5	26.7	22.0-31.0

1. For children weighing 22.75 kg. or more weight of clothing was about 0.25 kg; clothing of smaller school children weighed less than this. Clothing of adults weighed about 0.25 kg.
2. Measurement not obtained for one person in this group.

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Table 6

141 Mean Heights and Weights of Women in Random Sample of Village Households, Bang Chan, Compared to Heights and Weights of Thai Women as Reported by Other Observers.

	No.	Ages	Mean Height	Mean Weight[1]
			Cm.	Kg.
Women, Bang Chan	8	15-19 (Av. 17)	151.3	45.4
	45	20-81	151.3	45.3
Nurses, Siriraj Hospital[2]	198	17-26	152.6	47.5
Medical Students[2]	14	17-25	154.7	44.5
School girls[3]	76	19	152.0[4]	46.9[4]
School girls[3]	48	20	151.9[4]	47.4[4]
Laborers, Huahin Ry. Freight Service	32	20-40	156.2	49.9
Rural Women[5]	113	20-39	151.7	47.0

1. Clothing of women in Bang Chan weighed about 0.25 kg., and that of nurses about 0.5 kg. No estimates were given of weight of clothing of women in the other groups.

2. Chutima, 1939.

3. From tables in use at Dept. of School Hygiene, Bangkok.

4. Means for 2 groups classified on basis of physical status, but evidently not height or weight.

5. Calculated from figures given by Zimmerman, 1937.

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141 Among the men and boys in the random sample of house-
145 holds, however, mean height and weight was distinctly less for the age group 15-19 (mean age 17) than for the older age groups (Table 4), and mean height and weight increased with age among the subgroups. Thus mean height of 4 boys 18 and 19 years old was 157.6 cm., and mean weight 50.2 kg. as compared to 150.1 cm. and 38.5 kg. for 4 boys aged 15-16. Among the 20 men in age group 20-39, 3 were age 20, and 4 either 23 or 24. Mean heights for both of these subgroups were 157 cms. The number of young men examined in Bang Chan is too small to permit judgment as to when adult stature is attained. On the basis of measurements of Siamese males, from the medical service of the Royal Siamese Navy, Dr. Yong concludes that "growth, as regards both height and weight stops at age 22" (Chutima, 1939). According to Zimmerman (1937) rural Siamese boys increase in height steadily until about 19 years of age, at which time they seem to have reached maturity. Adult men in Bang Chan were on the average a little shorter than other groups of Thai men whose measurements were available to us (Table 7).

Bicristal Diameter. - Some additional information concerning body build is obtained from this measurement. In general, for Bang Chan children of elementary school age (Tables 1 and 2), mean bicristal diameters correspond to hip widths for Iowa school children one to three years younger (Stuart and Meredith, 1946). Mean bicristal diameters of adult men and women in Bang Chan (Tables 4 and 5) correspond approximately to the values for the 10th percentile of the 18 year old boys and girls in the Iowa study. Andrews (1943) found the hip breadth of Central Thai men to be 26.98 ± 1.48 cm., which is similar to the mean of 26.9 cm. for 31 adult males, aged 20-59, in Bang Chan.

141 Cristal Height. - At the time this study was undertaken,
145 the Committee on Anthropometry of the Food and Nutrition
125 Board, National Research Council had tentatively recommended cristal height as an additional measurement pertaining to the long dimension of the body. Mean values and ranges, for various age groups, are presented in Tables 1, 2, 4 and 5.

Dental Status

164 A dentist examined the teeth and mouths of 226 school
125 children, 7 to 14 years of age, in good natural light, using mouth mirror and probe. Teeth of persons in the random sample of village households were inspected by the physician in the course of the clinical examination. Data on dentition and dental health were analyzed by Kamalanathan (1956).

000 As noted by the Joint FAO/WHO Expert Committee on

[TEXT CONTINUED ON PAGE 21]

A,B,C,D,E [see p.: 16; 20; 9-13; 16, 17; 9-13, 16, 17]

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Table 7

141 Mean Heights and Weights of Older Boys and Men in Random Sample of Village Households, in Bang Chan, Compared to Heights and Weights of Older Boys and Men as Reported by Other Observers.

	No.	Ages	Mean Height	Mean Weight[1]
			cm.	kg.
Older boys, Bang Chan	9	15-19	153.8	45.1
Men, Bang Chan	37	20-66	158.6	53.0
Royal Agricultural College, North Siam[2]	302	17-24	164.5	55.6
Soldiers[2]	46	21	165.5	55.9
Medical students, Chulalongkorn University[2]	83	18-26	165.4	55.3
Convicts, Southern Penal Colony[2]	124	21-40	164.0	55.1
Students[3]	285	19	162.8	50.75[4]
Students[3]	50	21	164.2[4]	52.0[4]
Central Thai[5]	about 950	20+ mean 32.6	163.5 ± 5.44	53.48
Men, rural areas[6]	478	20-84	162.3 ± 5.43	54.05 ± 6.39

1. Clothing of men in Bang Chan weighed about 0.25 kg. and of the Central Thai studied by Andrews weighed approximately 0.5 kg. No estimates were given of weight of clothing of men in the other groups.

2. Chutima, 1939.

3. From tables in use at Dept. of School Hygiene, Bangkok.

4. Average for figures for 2 groups, classified on the basis of physical status, but evidently not height or weight.

5. Andrews, 1943.

6. Zimmerman, 1937.

Appendix B

Table 19

191 Summary of Heights and Weights[1] of 34 Pre-school Children in 145 the Random Sample of Village Households, Bang Chan, 1952-53

Age	No. of Persons	Height		Weight		
		Mean	Range	Mean	Median	Range
		cms.	cms.	kgs.	kgs.	kgs.
Males						
Mos.						
Under 1	2	50.8	50.0-51.5	3.4	3.4	2.95-3.8
5-6	1	61.0		5.5	5.5	
11-12	1	69.0		8.3	8.3	
Years						
1-1½	4	68.5	65.0-70.0	8.3	8.1	7.0 -10.0
2	1	89.0		13.0	13.0	
3-3½	3	86.7	83.5-90.0	11.2	10.5	10.0 -13.0
4-4½	4	96.5	90.5-104.5	14.2	14.0	12.75-16.25
4½-5	1	98.5		12.5	12.5	
6	2	105.0	101.5-108.5	17.0	17.0	16.5 -17.5
Females						
Mos.						
1	1	63.0		5.2	5.2	
3	1	54.0		5.5	5.5	
7	1	63.0		5.5	5.5	
9	1	60.5		6.3	6.3	
11-12	1	70.0		7.5	7.5	
Years						
1½-2	2	73.3	71.0-75.5	9.3	9.3	9.3 - 9.3
2½-3	2	81.5	81.0-82.0	10.5	10.5	10.0 -11.0
3½-4	3	85.5	85.0-86.0	11.7	12.0	10.5 -12.5
4½-5	1	94.5		12.5	12.5	
6	1	108.0		18.5	18.5	
7	1	107.5		17.5	17.5	

1. Preschool children were weighed nude.